installation, start-up, and operating instructions

HEAT RECOVERY VENTILATOR

HRVBBLHU, HRVBBSVU, HRVBBLVU

Cancels: New

II HRV-71-2
5-00

NOTE: Read the entire instruction manual before starting the installation.

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Fig. 1—HRVBBLHU Conventional Unit

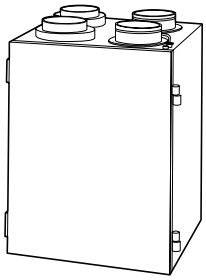

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Fig. 2—HRVBBSVU Compact Unit

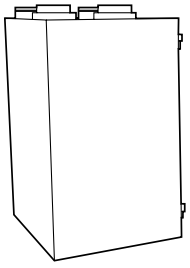

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Fig. 3—HRVBBLVU High Efficiency Unit

SAFETY CONSIDERATIONS

Installation and servicing of this equipment can be hazardous due to mechanical and electrical components. Only trained and qualified personnel should install, repair, or service this equipment.

Untrained personnel can perform basic maintenance functions such as cleaning and replacing air filters. All other operations must be performed by trained service personnel. When working on this equipment, observe precautions in the literature, on tags, and on labels attached to or shipped with the unit and other safety precautions that may apply.

Follow all safety codes. Installation must be in compliance with local and national building codes. Wear safety glasses and work gloves. Have fire extinguisher available during start-up and adjustment procedures and service calls.

Recognize safety information. This is the safety-alert symbol ⚠. When you see this symbol on the furnace and in instructions or manuals, be alert to the potential for personal injury.

Understand the signal words DANGER, WARNING, and CAUTION. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which **will** result in severe personal injury or death. WARNING signifies a hazard which **could** result in personal injury or death. CAUTION is used to identify unsafe practices which **would** result in minor personal injury or product and property damage.

INTRODUCTION

The Heat Recovery Ventilator (HRV) is used to exchange indoor stale air with outside fresh air. The HRV unit is equipped with a special heat recovery core which transfers sensible heat between the fresh incoming air and stale exhaust air.

It is recommended, but not required to locate the HRV in a conditioned space. Special attention should be given to condensate drain, duct application, balancing HRV, and locating unit for easy access and routine maintenance.

The cross-flow design core allows entering and leaving air streams to transfer heat energy without mixing. (See Fig. 15, and 18 through 25.)

LOCATION

I. INSPECT EQUIPMENT

Move carton to final installation location. Remove HRV from carton taking care not to damage unit. Remove all packaging and inspect unit for damage. Remove parts bag from inside unit. File claim with shipping company if shipment is damaged or incomplete. Check to make sure HRV unit matches Fig. 1 through 3 and 7 through 9.

II. SELECT LOCATION

The HRV **should be located in a conditioned space** and in close proximity to a fused power source. It should be easily accessible for routine maintenance.

If HRV is installed independent of a forced-air system, unit should be located near the center of the air distribution system. If HRV is installed in conjunction with a forced-air system, unit should be located next to (or close to) the indoor equipment.

UNIT INSTALLATION

> ⚠ **CAUTION:** Do not install HRV in a corrosive or contaminated atmosphere.

I. MOUNT UNIT

The HRV can be suspended from floor joists using chains and 4 springs. Attach metal hanging bracket to all 4 sides of cabinet. (See Fig. 4.) Unit should always be installed as level as possible.

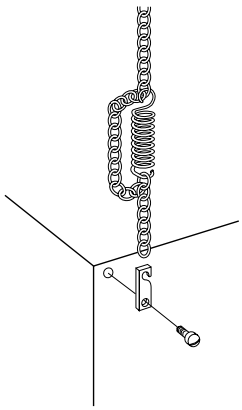

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Fig. 4—Chain Spring Installation

II. INDEPENDENT SYSTEM APPLICATION

In the absence of a forced-air system and a typical duct system layout, the HRV can be applied as an independent or stand alone unit. To ensure comfort, this type of application involves running both fresh-air, and return-air registers (or stale-air pickup registers) throughout the home.

> ⚠ **CAUTION:** Do not install return-air registers (or stale-air pickup registers) in same room as gas furnace or water heater.

Fresh-air registers are normally located in bedrooms, dining room, living room, and basement. It is recommended that registers be placed 6 to 12 in. from the ceiling on an interior wall and airflow directed toward ceiling. If registers are floor installed, airflow should be directed toward the wall.

Return-air (or stale-air pickup registers) are normally located to draw from kitchen, bathroom, basement, or other rooms where stale-air can exist.

Proper size and type of registers must be used to minimize pressure drop. The velocity of airflow through register should not be above 400 ft/minute.

Maximum length of duct for the system should be designed according to the highest speed of the unit. Refer to specifications listed in unit Product Data Digest for ventilation capacities.

III. FORCED-AIR APPLICATION

Most HRV applications will be installed in conjunction with new or existing forced-air system. To operate properly, the fresh-air supply and stale-air return from HRV connect directly to return-air duct system. This is how the HRV distributes fresh air and removes stale air from inside of building. (See Fig. 7.) For these installations, furnace or fan coil blower must be interlocked and operate continuously whenever HRV is energized.

Interlock relay kit Part No. KVAAC0101FIR is available and designed to interlock HRV with indoor equipment blower. When HRV is energized, R and G circuit inside of furnace or fan coil will energize. See Fig. 13 and interlock relay kit for additional information and Installation Instructions.

NOTE: The fresh air from HRV is introduced into return-air duct at a point no less than 6 ft upstream of furnace or fan coil. This connection should be direct. (See Fig. 7.) This is to allow incoming fresh-air to mix before entering indoor equipment.

IV. CONNECT DUCTS TO HRV

CAUTION: If HRV duct work is installed in an unconditioned space, insulated flexible duct is required.

Insulated flexible duct is required on both fresh-air inlet and exhaust-air outlet ducts connecting to exterior wall. When using insulated flexible duct, the vapor barrier of the flexible ducts must be taped very tight to prevent condensation problems. To reduce pressure drop, stretch the flex duct and support it in a proper manner to avoid reduced airflow.

When connecting the HRV to a return-air duct system, insulated flexible duct can be used. However, when metal or rigid ducts are applied use approximately 18-in. of flexible duct at HRV ports for fresh-air supply, and stale-air return. When using metal duct from fresh-air supply to system duct work, the metal duct should be insulated. (See Fig. 5.) This can act as a silencer when connecting ducts to return-air duct system. This should eliminate transmission of noise or vibration from unit to main duct system.

NOTE: Balancing dampers should be installed in stale air exhaust and fresh air intake ducts before connecting to the HRVBBSVU and the HRVBBLVU units. The balancing dampers are provided in the HRVBBLHU units (see balancing HRV section).

V. CONDENSATE DRAIN

To connect condensate drain, proceed as follows:

1. Insert sleeved grommets into bottom of unit using the gasket washer and nut. (see Fig. 6).
2. Cut two sections of plastic tubing, about 12" long and attach them to each drain.
3. Join the two short sections of plastic tubing to the "T" connector and the main tube as shown.
4. Make a loop in the tubing below the "T" connector to create a trap to prevent sewer gases from entering the ventilation system. (See Fig. 6.)
5. Connect unit drain to building's main drain. Provide slight slope from unit for run-off.

VI. LOCATE AND INSTALL EXTERIOR HOODS

IMPORTANT: To prevent condensation problems, insulated flexible ducts are required on both fresh-air inlet and exhaust-air outlet ducts connecting between HRV and exterior wall.

Fresh-air intake and stale-air exhaust must be separated by at least 6 ft. Fresh-air intake must be positioned at least 10 ft from nearest dryer vent, furnace exhaust, driveway, gas meter, or oil fill pipe. Fresh-air intake must be positioned as far as possible from garbage containers and potential chemical fumes. When possible, it is advised to locate the intake and exhaust hoods on same side of house or building. The intake and exhaust hoods should never be located on interior corners or in dead air pockets. (See Fig. 7.) Both intake and exhaust hoods must be 18 in. from ground and at least 12 in. above anticipated snow level.

After selecting proper hood locations make appropriate size hole through exterior wall, pass flexible duct through hole and insert hood tube into duct. Tape duct vapor barrier tightly around hood tube and insert assembly back into wall and fasten securely.

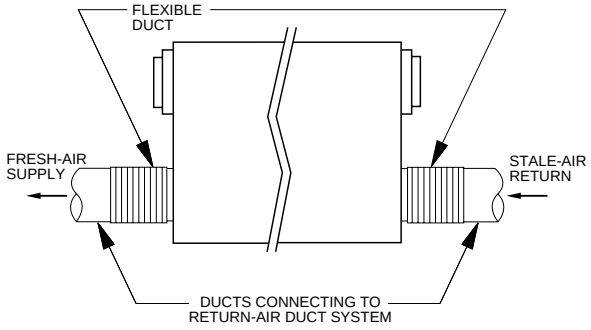

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Fig. 5—Flexible Duct Fit-Up

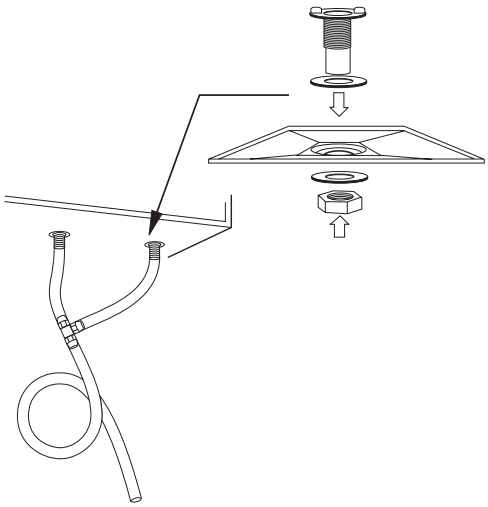

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Fig. 6—Condensate Drain With Loop Trap

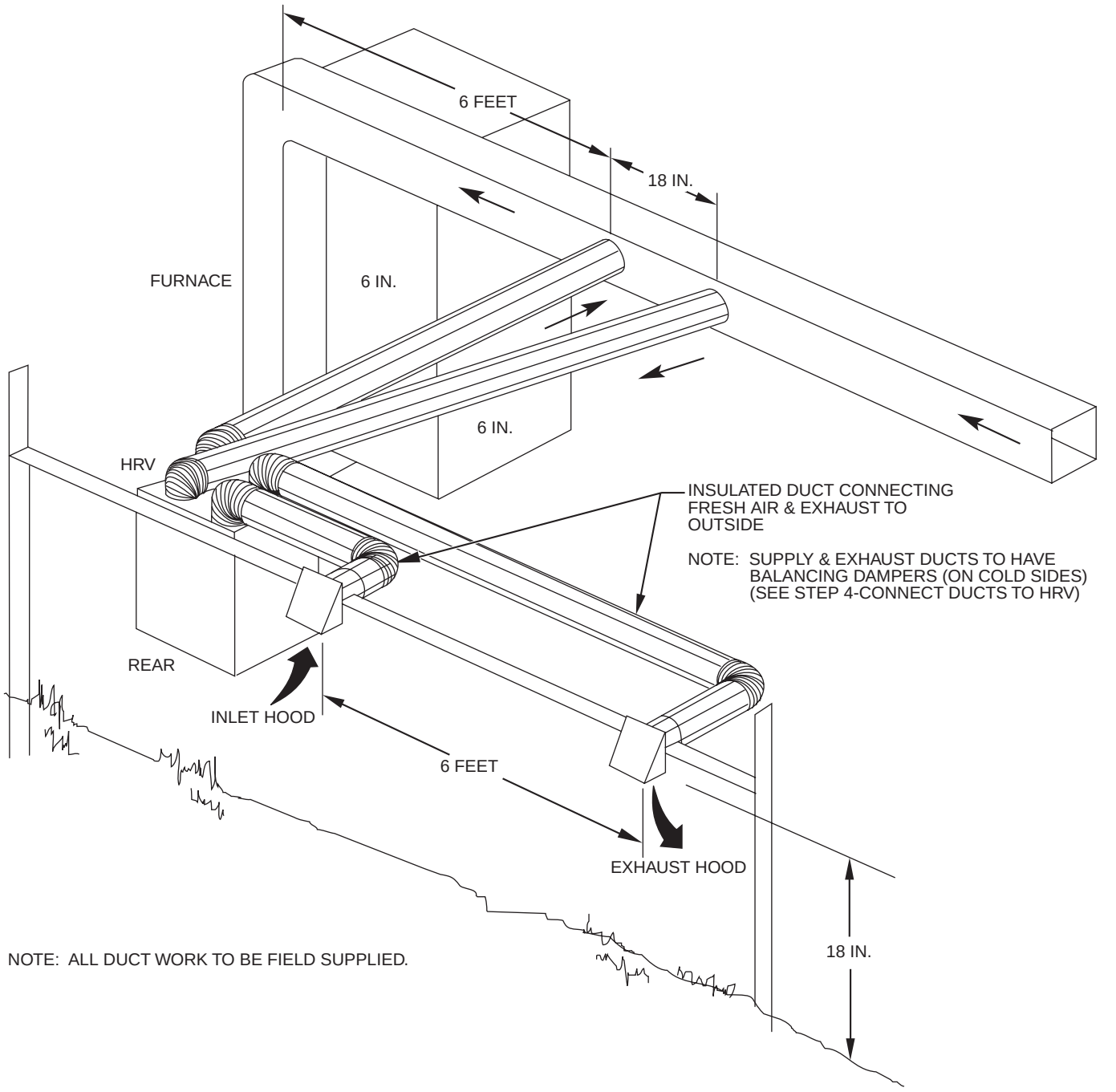

Fig. 7—Exhaust Ventilation

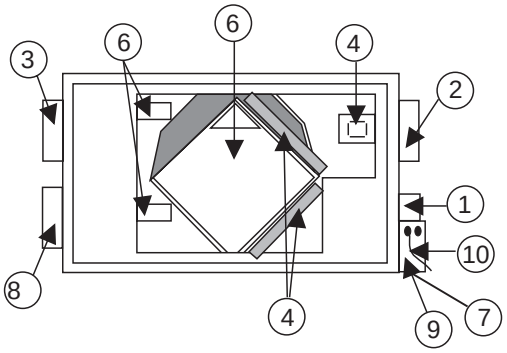

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Fig. 8—HRVBBLHU Conventional Horizontal Unit

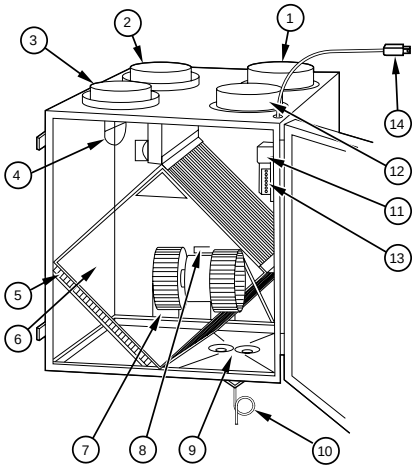

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Fig. 9—HRVBBSVU Compact Unit

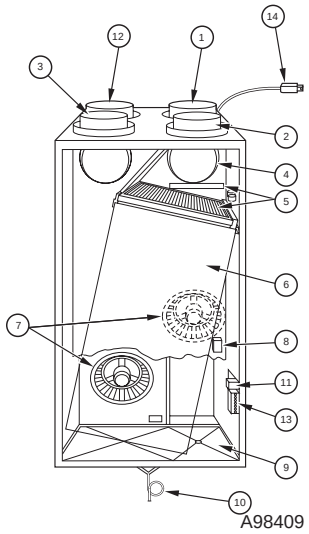

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Fig. 10—HRVBBLVU Compact High-Efficiency Unit

COMPONENT DESCRIPTION

The following listed items are components of HRVBBLHU. (See Fig. 8)

1. Stale air return from building connected to return-air duct system.
2. Fresh air intake connected to outdoor air inlet hood.
3. Exhaust air connected to outdoor air exhaust hood.
4. Mechanical filters trap dust contained in the air.
5. Heat recovery core is either a cross-flow type for compact models, or a counter-flow type for high efficiency models. The core transfers heat between the 2 air streams.
6. Blowers bring in fresh air from outside and exhaust stale air to outside.
7. Electronic control circuit ensures proper unit operation.
8. Fresh air supply from HRV connected to return air duct of forced air system.
9. Terminal connector block for wiring wall and timer controls.
10. Electrical cord connects to standard 115-v outlet.

The following listed items are components of HRVBBSVU and HRVBBLVU. (See Fig. 9 and 10)

1. Stale air return from building connected to return-air duct system.
2. Fresh air intake connected to outdoor air inlet hood.
3. Exhaust air connected to outdoor air exhaust hood.
4. Dampers are used to control air exchange with outdoor air during defrost mode.
5. Mechanical filters trap dust contained in the air.
6. Heat recovery core is either a cross-flow type for compact models, or a counter-flow type for high efficiency models. The core transfers heat between the 2 air streams.
7. Blowers bring in fresh air from outside and exhaust stale air to outside.
8. Capacitor required for motor operation.
9. Condensation tray collects condensate from heat recovery core.
10. Drainage tubes connects to sleeved grommets
11. Electronic control circuit ensures proper unit operation.
12. Fresh air supply from HRV connected to return air duct of forced air system.
13. Terminal connector block for wiring wall and timer controls.
14. Electrical cord connects to standard 115-v outlet.

WALL CONTROL

I. LOCATION

The HRV wall controls are unique to HRV and must be installed for proper unit operation.
Three wall control options are available:

1. Basic Control
2. Standard Control
3. Automatic Control

II. BASIC CONTROL OPERATION

The basic control contains a 3 position slide switch which is used to manually select OFF, LOW, and HIGH speed blower operation. The unit operates continuously when LOW or HIGH is selected. (See Table 1.)

III. STANDARD CONTROL OPERATION

The standard control contains an adjustable dehumidistat, and a 3 position slide switch which is used to manually select between OFF, LOW, and INTERMITTENT modes. There are 2 LEDs on the control to indicate operating mode. (See Table 2.) This control offers 2 modes of operation:

1. With switch off, HRV is inoperative and both LEDs are out. (See Fig. 14.)
2. With switch on LOW, HRV continuously exchanges air with outside. If dehumidistat is satisfied, blower will run in low speed, otherwise, blower will run on high speed. Both LEDs are illuminated all the time.
3. With switch on INTERMITTENT, the HRV exchanges air with outside on high-speed blower, and unit shuts down when dehumidistat is satisfied. The ON LED is illuminated all the time, and AIR EXCHANGE LED is illuminated only when unit is running. This mode is ideal for maintaining proper humidity levels when no one is home.

IV. AUTOMATIC CONTROL OPERATION

This control contains an adjustable dehumidistat and push button switch to cycle between 3 modes of operation. There are 5 LEDs to indicate mode of operation. (See Table 3.)

NOTE: This control is designed to be used primarily with installations which are independent of a forced air system (models HRVBBSVU and HRVBBLVU only).

1. Initially the switch is off. All LEDs are off and HRV is inoperative.
2. First push of mode button puts HRV into intermittent mode. The HRV operates at high speed when there is a call for dehumidification. Intermittent and exchange LEDs are illuminated. When dehumidistat is satisfied, HRV shuts down and exchange LED goes out.
3. Next push of mode button puts system in continuous mode. Continuous and exchange LEDs remain on. The HRV operates at high-speed blower during calls for dehumidification and low speed when dehumidistat is satisfied.
4. Next push of mode button puts system in circulation mode. HRV operates in high speed at all times. Circulation LED remains on. When there is a call for dehumidification, exchange LED is on and HRV exchanges air with outside. When dehumidistat is satisfied, HRV dampers close which recirculates indoor air. The exchange LED goes off.
5. The maintenance light illuminates every 3 months to indicate filter should be cleaned. It is reset by opening the door to the HRV.

NOTE: The standard and automatic controls sense humidity not temperature. Either control must be located in an area where it will continually monitor fresh air circulating within the home. Install HRV wall control as close as possible to main system thermostat and follow same guidelines as installing a thermostat, (locate approximately 5 ft. [60 in.] above floor, mount on an inside partitioning wall, etc).

TABLE 1—BASIC CONTROL

MODE	OPERATION	DAMPER POSITION	FAN SPEED
Off	Off	Closed To Outside	Off
Low	Air Exchange With Outside	Open To Outside	Low
High	Air Exchange With Outside	Open To Outside	High

TABLE 2—STANDARD CONTROL

MODE	DEHUMIDISTAT POSITION	OPERATION	DAMPER POSITION	FAN SPEED	ON LED	AIR EXCHANGE LED
Off	Any	Off	Closed to outside	Off	Off	Off
Low	Satisfied	Off	Open to outside	Low	On	Off
	Call for dehumidification	Air exchange with outside	Open to outside	High	On	On
Intermittent	Satisfied	Air exchange with outside	Closed to outside	Off	On	Off
	Call for dehumidification	Air Exchange with Outside	Open to outside	High	On	On

TABLE 3—AUTOMATIC CONTROL

MODE	DEHUMIDISTAT POSITION	OPERATION	DAMPER POSITION	FAN SPEED	INDICATOR LEDS
Off	Any	Off	Closed to outside	Off	OFF
Intermittent	Satisfied	Air exchange with outside	Open to outside	Off	Intermittent ON
	Call for dehumidification	Air exchange with outside	Open to outside	High	Intermittent and Exchange ON
Continuous	Satisfied	Air exchange with outside	Open to outside	Low	Continuous and Exchange ON
	Call for dehumidification	Air exchange with outside	Open to outside	High	Continuous and Exchange ON
Recirculation	Satisfied	Recirculation	Closed to outside	High	Recirculation ON
	Call for dehumidification	Air exchange with outside	Open to outside	High	Recirculation and Exchange ON
Any	Any	Any		Any	Maintenance (open door)

TABLE 4—RECOMMENDED HUMIDITY LEVELS

OUTSIDE TEMPERATURE		DOUBLE-PANE WINDOWS	TRIPLE-PANE WINDOWS
50° F	10° C	55 percent	65 percent
32° F	0° C	45 percent	55 percent
14° F	-10° C	35 percent	45 percent
-4° F	-20° C	30 percent	45 percent
-22° F	-30° C	25 percent	35 percent

If the level of humidity falls too low in the winter months while operating in the continuous exchange mode, a humidifier may be integrated into the system. Intermittent exchange mode may also be selected for short periods of time to increase the level of humidity.

V. WIRING

Remove top cover assembly from wall control and pass thermostat wire through hole located on back of control before attaching to wall. Connect Y, R, G, and B (yellow, red, green and black) between wall control and HRV circuit board. Following color code. (See Fig. 11 and 12.) Replace top cover assembly.

NOTE: HRV wall control and circuit board operate on 12vdc.

VI. HUMIDITY SELECTOR

The humidity selector is a built-in dehumidistat designed to properly control the level of humidity in the house during the winter months. This control helps avoid condensation problems in upper northern regions where indoor humidity is a problem during the winter season.

NOTE: This control is not to be confused with a dehumidistat used during the summer months to control high relative indoor humidity.

Table 4 recommends humidity levels to avoid condensation.

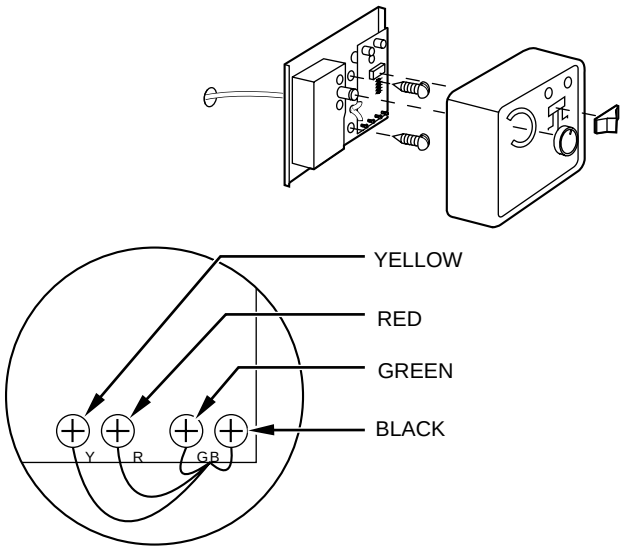

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Fig. 11—Typical Wall Control

ELECTRICAL CONNECTIONS

I. 115-VAC WIRING

The HRV operates on 115vac. It comes with a power cord attached to unit and ready to plug into a fused outlet. Unit must be grounded for proper operation.

All electrical connections must comply with National and Local Electrical Codes, or other ordinances that might apply.

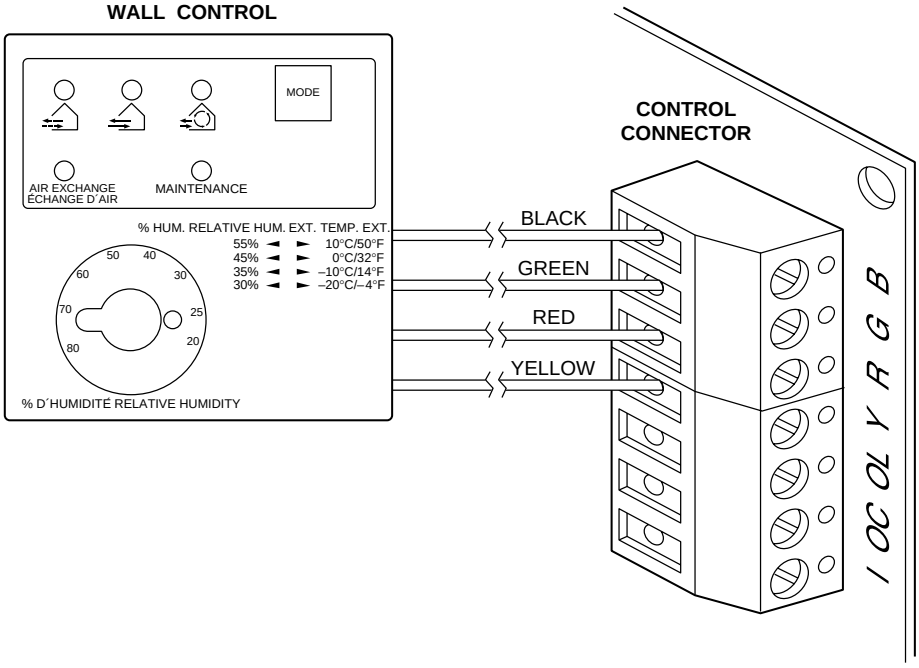

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Fig. 12—Control Connections

> **CAUTION:** Do not use an extension cord as a power source for operating the HRV.

II. 12-VDC WIRING

The HRV circuit board, wall control, and accessories operate on 12vdc. See Wall Control section, item Wiring and Fig. 11 and 12 for more information.

ACCESSORIES

I. INTERLOCK RELAY

The interlock relay kit, Part No. KVAAC0101FIR is required when installing HRV into a forced-air heating and cooling system. (See Fig. 13.) For additional information, refer to Installation Instructions supplied with interlock relay kit.

The purpose of interlock relay kit is to energize indoor system equipment (furnace or fan coil) blower whenever HRV is calling. If HRV is energized, and indoor system equipment is not, interlock relay will energize and make R and G at indoor equipment. This will insure fresh air distribution throughout the building via the central duct system.

II. 20 MINUTE TIMER

A push button timer can be used to override the wall control and put the HRV into high speed for 20 minutes. Connect switches in parallel and connect leads to HRV terminals I, OC, and OL. (See Fig. 14.) Push button locations are ideal in special activity areas, such as, bathrooms or kitchen, where high-speed exhaust operation is needed for a short period of time.

NOTE: The 20 minute timer will not function properly unless HRV wall control is applied and working correctly. Timing function is internal to electronic circuit board, it is activated by a momentary contact between OC and OL. The I connection is to illuminate the push button. The maximum number of push button timers that can be applied is 5.

III. 60 MINUTE ADJUSTABLE TIMER

A 60 minute adjustable timer can also be used to override wall control and put HRV into high-speed operation for a select amount of time. Connect timer in parallel with push button timers, or to HRV terminals OC and OL. (See Fig. 14.)

The 60 minute timer will provide a minimum of 30 minutes, and a maximum of 80 minutes of ventilation at high speed. When adjustable timer expires, an additional 20 minutes will remain as a result of the internal timer of HRV electronic circuit board.

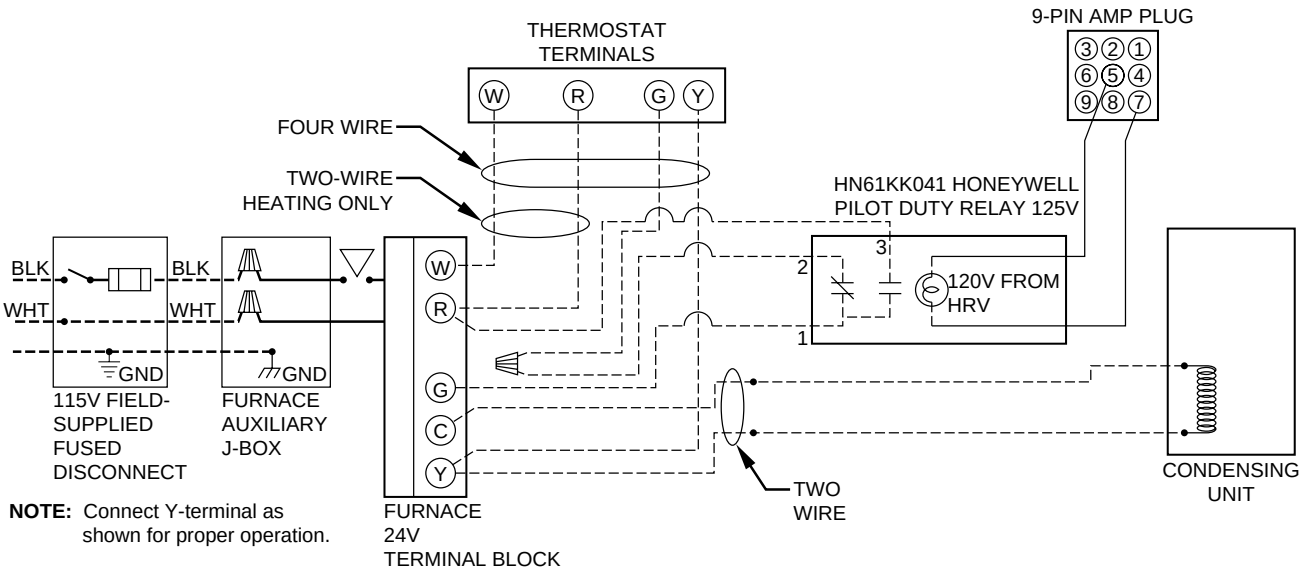

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Fig. 13—Interlock Relay Wiring Layout

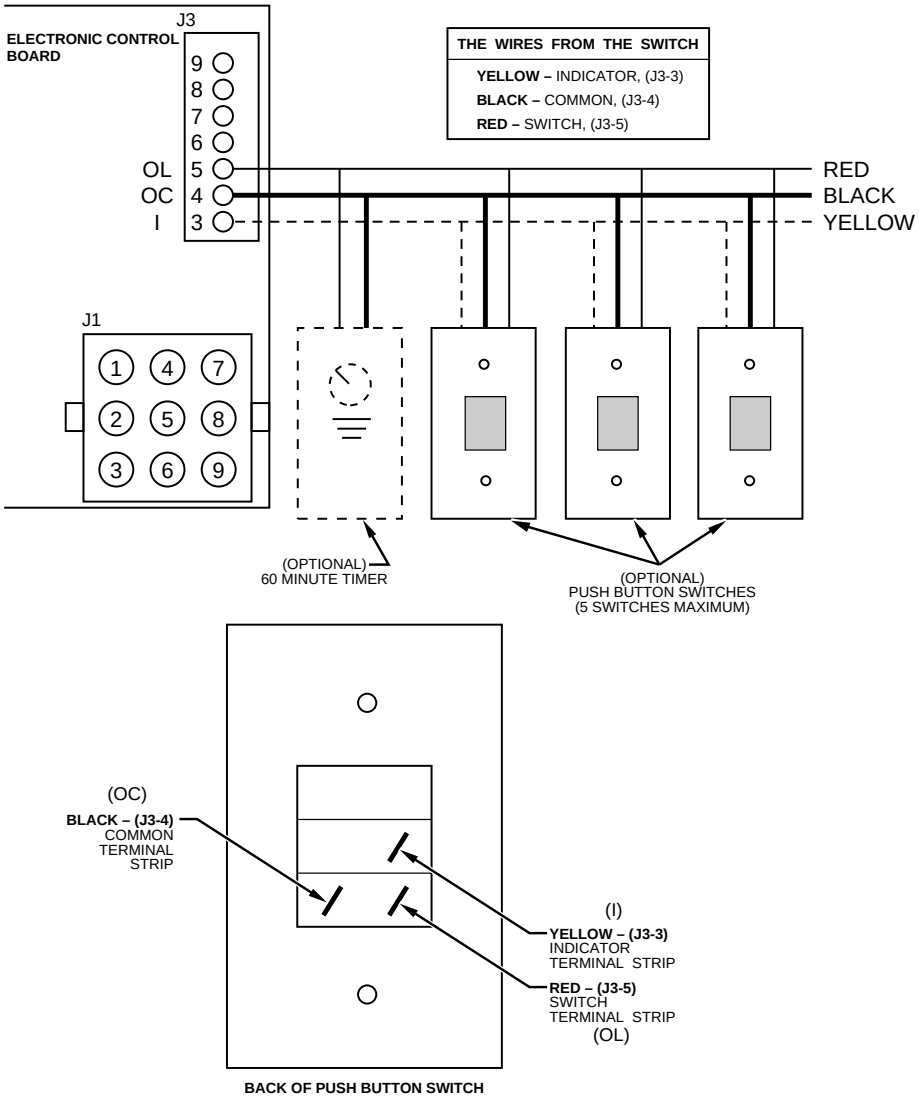

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Fig. 14—Push Button Timer Wiring Layout

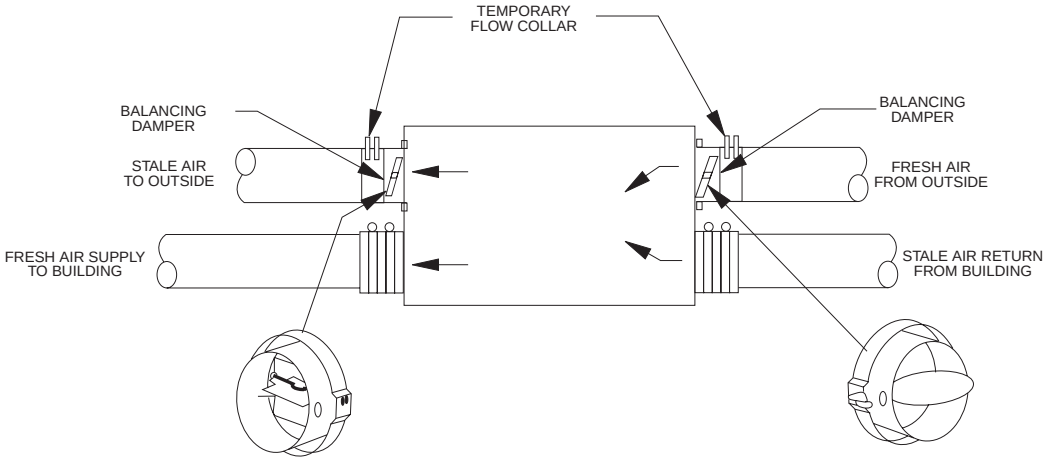

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Fig. 15—Balancing HRVBBLHU

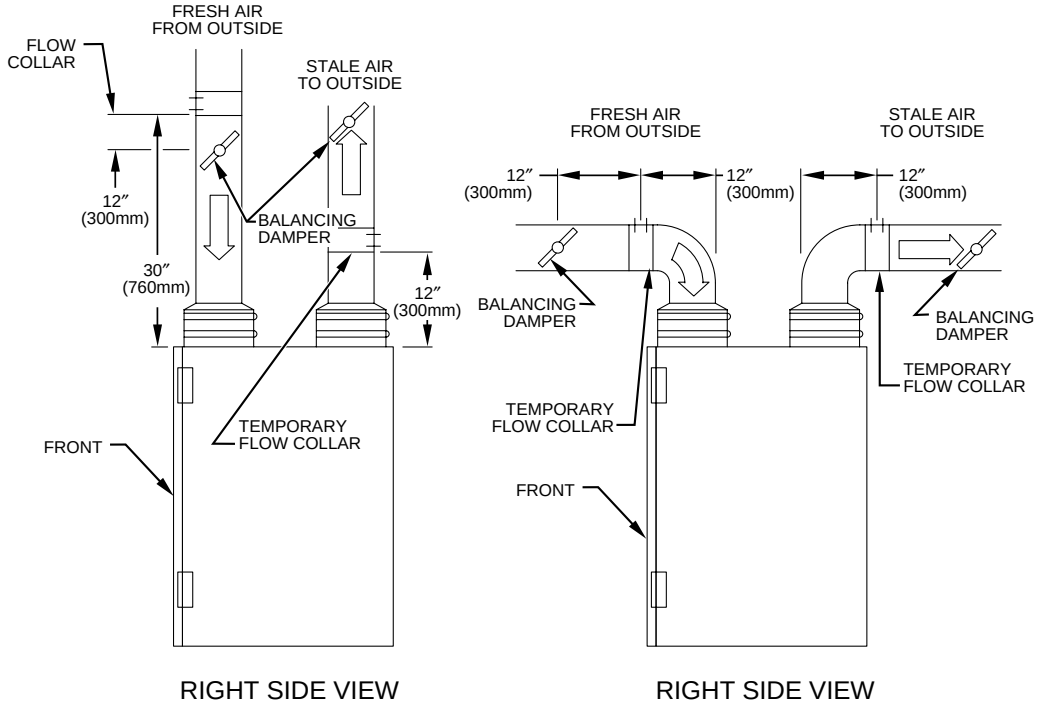

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Fig. 16—Balancing HRVBBSVU and HRVBBLVU

BALANCING HRV

Balancing intake and exhaust airflow is very important for proper system operation and optimum performance when applying an HRV. Unit balancing prevents a positive and/or negative pressure within the home. Balancing the HRV is done by applying temporary flow collars and permanent balancing dampers to the fresh air intake and stale air exhaust ducts. (See Fig. 15 and 16.) Airflow is determined by connecting a magnehelic gage to the temporary flow collar. (See Fig. 17.) Both flow collars and magnehelic gage are included in the accessory start-up balancing kit.

If supply-air from outside is greater than exhaust-air from the house, an imbalance can result over pressurizing the home. If exhaust-air is greater than supply-air, combustion appliances may backdraft, bringing exhaust fumes into the house. A balanced condition will ensure optimum performance, provide satisfied customers, and avoid expensive callbacks.

Before proceeding with balancing, all windows, doors, and fireplace flues should be tightly closed. No exhaust systems such as range top exhausts, dryer exhaust, fume hoods, bath or roof fans should be in operation. The forced-air furnace (if used for circulation) should be operating in continuous fan mode for normal operating speed.

I. BALANCING DAMPERS

Balancing dampers (some times called butterfly dampers) are provided with the HRVBBLHU. The dampers for the HRVBBSVU and HRVBBLVU are field supplied and should be permanently located in fresh-air intake and stale-air exhaust ducts between HRV and exterior wall. (See Fig. 15 and 16) Some field modification may be required to ensure proper installation of balancing dampers while located in flexible duct. Insulating over these dampers is strongly recommended after balancing is complete to prevent condensation problems.

II. FLOW COLLAR

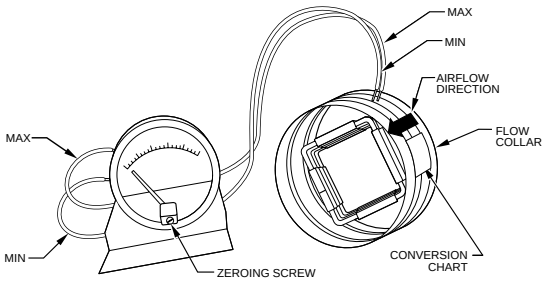
Flow Collars are temporary, and should be installed as close to HRV as possible and in straightest sections of duct to ensure accuracy. (See Fig. 15.) If only 1 flow collar is available, install collar in stale-air duct of HRV, and record airflow. Next, install

collar in the fresh-air duct and record airflow. If 2 flow collars are available, it will be much easier to read airflow and properly adjust dampers to balance unit.

With speed control at maximum speed (high-speed operation) and continuous air exchange occurring with outside, connect hoses from flow collar to a magnehelic gage. (See Fig. 17.) The gage must be leveled and zeroed before use to read accurately. If needle falls below zero, reverse hose connections.

Measure exhaust air first, it is typically the lowest pressure due to nature of system and ductwork. Next, measure fresh air. If fresh air reading is higher than exhaust reading, adjust damper until reading is same. If reading is lower, return to exhaust damper and adjust to obtain same reading. You can use label on flow collar to convert static pressure into airflow.

Once HRV is balanced and dampers are adjusted to equalize airflow, use tape or drive screws to prevent damper blades from moving. Remove flow collars and secure ducts. This procedure should be repeated to ensure unit is balanced properly.

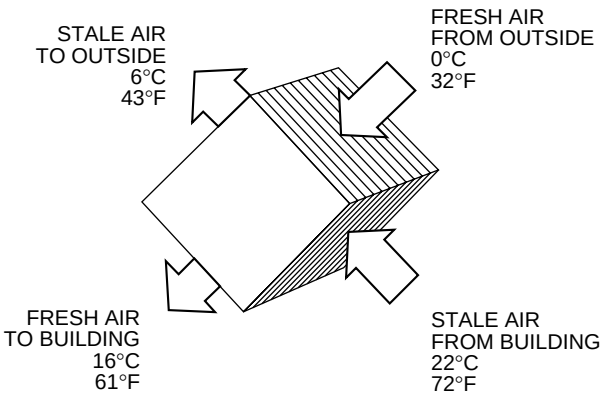


A98400

Fig. 17—Magnehelic Gage

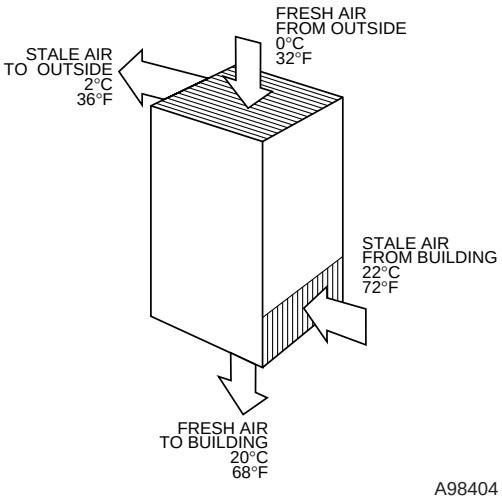
NOTE: The flow collar directional arrow (on flow collar) must be oriented in the airflow direction of unit.

NOTE: Some field modification may be required to ensure proper temporary installation of flow collar during balancing when insulated flexible duct is used.



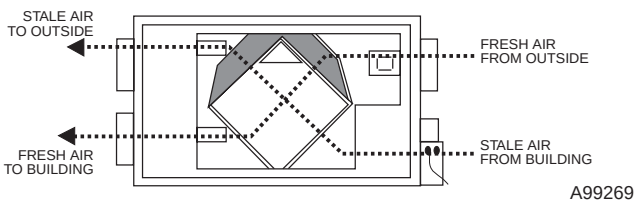
A98403

Fig. 18—HRVBBLHU and HRVBBSVU Cross Flow



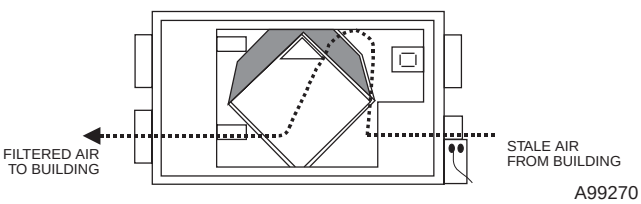
A98404

Fig. 19—HRVBBLVU Counterflow



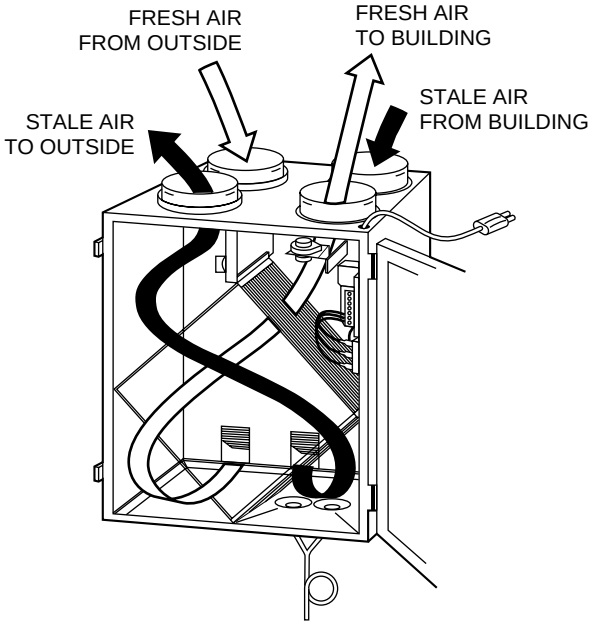
A99269

Fig. 20—HRVBBLHU Airflow During Air Exchange



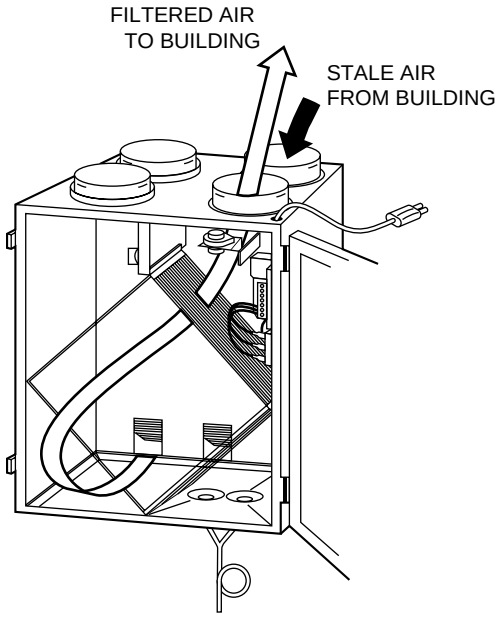
A99270

Fig. 21 —HRVBBLHU Airflow During Defrost



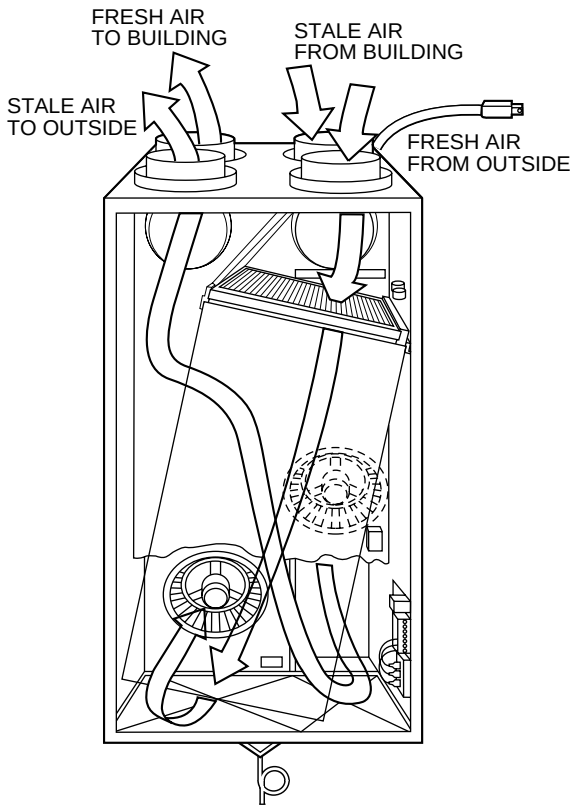
A92382

Fig. 22—HRVBBSVU Airflow During Air Exchange



A92383

Fig. 23—HRVBBSVU Airflow During Recirculation and Defrost



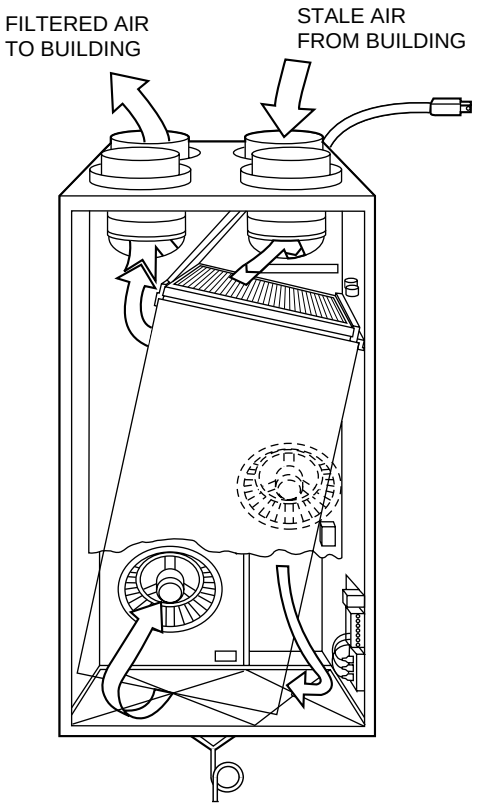
A92384

Fig. 24—HRVBBLVU Airflow During Air Exchange

VENTILATION EVALUATION

> ⚠ **CAUTION:** DO NOT use HRV during construction of a house or when sanding drywall. This type of dust may damage system.

When ventilation requirement is determined, use Product Data Sheets to reference unit airflow delivery and performance.

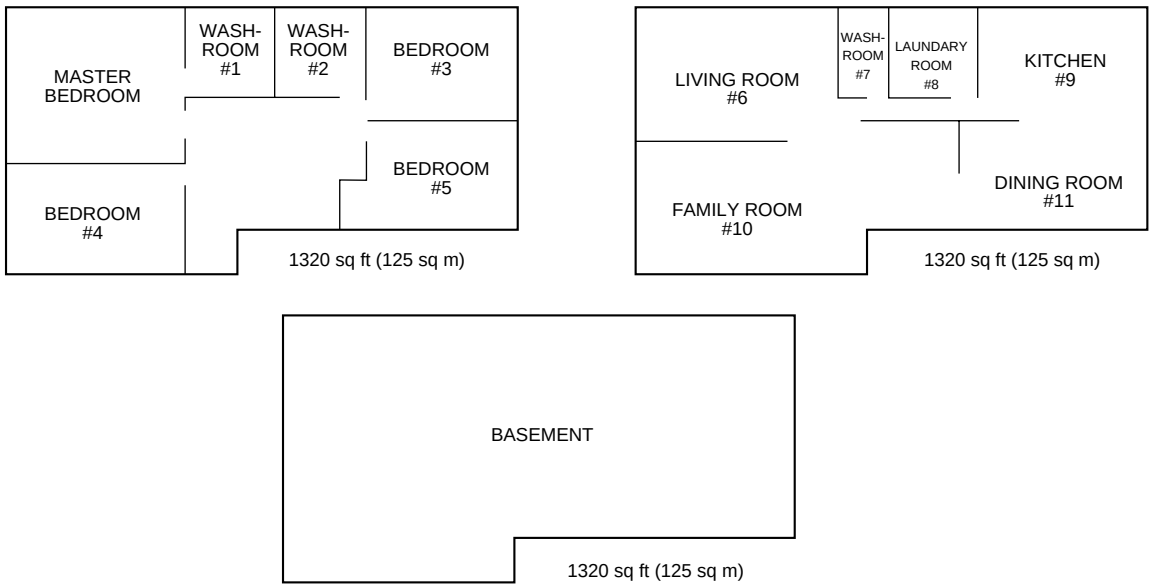


A92385

Fig. 25—HRVBBLVU Airflow During Recirculation and Defrost

The ventilation capacity of an HRV unit while at maximum speed is defined according to greatest total airflow required. These methods are derived from the Canadian National Building Code 1995 version and the CSA F326.1 revision.

The following 2 methods can be used to evaluate the approximate ventilation needs of a house. Accuracy of calculations are dependent upon the information available and knowing critical measurements of the structure. (See Fig. 26.)



A98388

Fig. 26—Floor Plan Example

METHOD 1

To calculate approximate ventilation:

The sum of rooms X 10 CFM per room, plus 20 CFM for a master bedroom or basement.

Example: 11 rooms X 10 CFM + 2 X 20 CFM = 150 CFM.

NOTE: The master bedroom and basement are not included in first part of this equation, but figured in at second part of equation.

METHOD 2

To calculate approximate ventilation:

Referencing same example. (See Fig. 26.) Total cu ft X 0.3 per hr = total. Take total and divide by 60 to get CFM.

Example:

1320 sq ft X 8 ft in height = 10560 cu ft per floor
10560 cu ft X 3 floors = 31680 total cu ft in house
31680 cu ft X 0.3 air change per hr = 9500 cu ft
9500 cu ft ÷ 60 minimum per hr = 160 CFM

Conclusion: The total amount of airflow needed is 160 CFM. This falls within airflow range of a HRVBBLHU1150 size unit.

CONTROL BOARD OPERATION

I. BOARD FUNCTION

NOTE: To ensure proper operation of HRV, configuration jumpers are located on electronic control board and must match configuration setup shown on Fig. 27 and 28 under Jumper Table. Jumpers are factory set and do not require any changes unless control board is replaced. If control board is replaced, or you encounter unusual start-up operation, check jumpers to make sure they are located properly. (See Fig. 27 and 28.)

II. DEFROST

The HRV continually monitors the outside air temperature. If the outside air is at or below 23°F(-5°C), the HRV will initiate a defrost cycle by closing the outside air damper and re-circulating warm indoor air through the heat recovery core. This happens approximately every hr with 5 minute defrost cycle. During this process, core is defrosted without the use of electric strip heat. At 5°F(-15°C), unit will defrost for 5 minutes every half hr. At -22°F(-30°C), the unit will sense a need to defrost every 20 minutes with a 5 minute cycle. See the Troubleshooting section for a control logic explanation.

III. OFF AND INTERMITTENT/OFF MODE

When HRV is Off, K1 relay is open, and K5 relay is energized which closes outside air damper. (See Logic Diagram in Fig. 27 and 28.)

IV. HIGH-SPEED AIR EXCHANGE

When high-speed air exchange occurs, K1 and K2 relays are energized and K5 relay is de-energized. This opens low-speed contacts, and closes high-speed contacts on K2 relay. This also opens contacts on K5 relay which opens outside air damper. Then, 115vac is applied between orange and gray wires on Molex plug (pins 1 and 6) and blower motor runs in high-speed operation. Also, 115vac is applied across pins 5 and 7, this energizes interlock relay. (See Logic Diagram in Fig. 27 and 28.)

V. LOW-SPEED AIR EXCHANGE

When low-speed air exchange occurs, K1 Relay is energized which closes the contacts. K2 and K5 relays are de-energized. This keeps low-speed contacts closed and high-speed contacts open on K2 relay, and opens outdoor air damper. 120vac is applied between Red and Gray wires on Molex plug (pins 1 and 4) and blower motor runs in low-speed operation. Also, 115vac is applied across pins 5 and 7, this energizes interlock relay. (See Logic Diagram in Fig. 27 and 28.)

CARE AND MAINTENANCE

⚠ **WARNING:** Before installing or servicing system, always turn off main power to system. There may be more than 1 disconnect switch. Electrical shock can cause personal injury or death.

⚠ **CAUTION:** Although special care has been taken to minimize sharp edges in the construction of your unit, be extremely careful when handling parts or reaching into the unit.

I. DOOR

HRV door can be removed by unlatching brief case style latches, then slide door to the right and remove it from hinges. Door must be in place and secured shut for proper operation.

II. FILTER

Filters in HRV are washable and should be cleaned every 3 months. Use a vacuum cleaner to remove heaviest portion of accumulated dust, then wash in lukewarm water. Allow filter to completely dry before reinstalling. A dirty air filter will cause excessive strain on blower motor. Never operate unit without a filter. Vacuum out debris.

In addition, regularly check and clean screens on exterior intake and exhaust hoods when necessary.

> ⚠ **CAUTION:** DO NOT clean filters in a dishwasher and DO NOT dry them with a heating appliance or permanent damage will result.

III. BLOWER MOTOR AND WHEEL

HRV blower motors are factory lubricated for life. Lubricating bearings is not recommended. However, inspect and clean any accumulated dirt and grease from blower motor and wheel annually.

IV. CLEANING THE CORE

HRV unit is equipped with special heat recovery core and must be handled with care. We recommend that it be washed once a year following the season of most intense use. This will ensure maximum efficiency of the plastic partitions within the core.

Allow heat recovery core to soak for 3 hr in a solution of warm water and mild soap. Rinse under heavy stream of water. Hot water and strong detergent will damage core and should NOT be used.

TROUBLESHOOTING

> ⚠ **WARNING:** Before installing or servicing system, always turn off main power to system. There may be more than 1 disconnect switch. Electrical shock can cause personal injury or death.

> ⚠ **CAUTION:** Although special care has been taken to minimize sharp edges in the construction of your unit, be extremely careful when handling parts or reaching into unit.

NOTE: Reference Table 5 Troubleshooting Chart

This can be a quick guide in resolving unit problems. It is also recommended to review and understand Wall Control Board Operation and Care and Maintenance sections before continuing. There are 3 main parts to focus on when troubleshooting HRV unit:

1. Wall control
2. Electronic control board
3. Blower motor

I. WALL CONTROL

Typically the wall control is either good, or it is bad. Use Table 1, 2, or 3 to determine if wall control is operating correctly. Use Fig. 12 to check control wire connections.

NOTE: The electronic control board and wall control operate on 12vdc.

II. CONTROL BOARD

Electronic control board must have wall control attached before unit will function properly. Also, configuration jumpers located on control board must match configuration setup shown on Fig. 28 under Jumper Table. In addition, outside air thermistor must be connected to control board for it to operate properly. See Table 6, Temperature -vs- Ohm Chart, for valid temperature range.

III. BLOWER MOTOR

The HRV blower motor operates on 115vac, with 2-speed operation.

The easiest way to check blower speed operation is to use the wall control and initiate a low-speed blower and high-speed blower operation.

NOTE: If there is a short circuit or an open circuit at thermistor, CPU will go into a 5 minute defrost cycle every 20 minutes. This feature is not there on older board versions with 3pin jumpers.

OVERRIDE TEST

To use override test function, a thermistor must be connected to the control board. Unit must not be in defrost mode during an override test.

A. High Speed

1. Disconnect HRV from 115vac.
2. Unplug wall control wires at control module terminal block inside HRV.
3. Plug HRV back to 115vac.
4. Attach a wire across J3-8 and J3-9 (B and G) on control module terminal block.
5. Push in door switch, this will initiate a high-speed exchange.

B. Low Speed

1. Unplug HRV from 115vac.
2. Disconnect wall control wires at control module terminal block inside HRV.
3. Plug HRV back to 115vac.
4. Connect a 3.9 Kohm resistor between J3-8 and J3-9 (B and G) on control module terminal block.
5. Push in door switch, this will initiate a low-speed exchange.

IV. BLOWER SPEED SELECTION

Three-speed blowers are factory connected to electronic control board on HIGH- and LOW-speed taps of blowers. Installer can easily change low-speed tap to medium-speed tap so electronic control will select between high and medium speed. Connections can be changed at motor location. (See Tables 7 and 8.)

To change low speed to medium speed, proceed as follows:

1. Unplug unit from 115vac.
2. Locate blower assembly.
3. Locate red wire and blue wire coming from blower assembly.
4. Unplug red wire from quick connect.
5. Unplug protecting cap quick connection from blue wire and put on red wire coming from blower. The cap is a safety insulator.
6. Connect red wire of main harness to blue wire.
7. Replace wires.

V. DEFROST

Defrost cycle is controlled by a thermistor which is located in the fresh-air intake passage (the thermistor unit is connected to J4 of control module. See Fig. 27 and 28). When defrost temperature sensor detects the need for defrost, K5 relay will close for 6 minutes while K1 and K2 remain energized.

This closes the outdoor air damper while running HRV blower on high-speed. This process recirculates warm indoor air through heat recovery core which melts any frost that has formed. Water created in this process is collected by HRV and drained away. Frequency of the defrost cycle depends on outdoor temperature (see Table 10).

If defrost is not working properly, check for proper damper operation. To do this, turn unit to OFF position. Damper should close.

SAFETY FEATURE

This new control has an added safety feature. If microprocessor does not detect the thermistor or detects a short circuit, unit will automatically go into a 6 minute defrost cycle every 20 minutes.

TABLE 5—TROUBLESHOOTING CHART

SYMPTOMS	CAUSES	SOLUTIONS
Air too humid	Continuous exchange mode used in small houses	Use Intermittent Mode Check humidity level settings
Unit not responding to wall control	Defrost condition is in effect Outdoor temperatue is below 23°F	Unit will operate when not in defrost mode. Defrost cycle is based on outdoor ambient (see Table 10)
	Broken control wire	Test wall control Check connections Check thermistor
Unit stops momentarily	Electrical supply interrupted	Check units circuit breaker
Air from distribution register too cold	Improper calibration of air flow	Check calibration of flow rates
Unit makes annoying noise	Ventilation wheel out of adjustment	Remove the motor and screw wheel on properly
Noise level too high at distribution registers when in high speed	Air duct system too short	Install a duct silencer

TABLE 6—TEMPERATURE/OHM RELATIONSHIP

TEMP F°	OHMS
30	34,480
32	32,630
34	30,760
36	29,220
38	27,470
40	26,020
42	24,680
44	23,320
46	22,070
48	20,910
50	19,830
52	18,820
54	17,870
56	16,920
58	16,160
60	15,260
62	14,530
64	13,790
66	13,090
68	12,480
70	11,860
72	11,270
74	10,750
76	10,250
78	9,750
80	9,300
82	8,840
84	8,432
86	8,042
88	7,668
90	7,310
92	6,993
94	6,661
96	6,368
98	6,085
100	5,811
102	5,571
104	5,313
106	5,088
108	4,869
110	4,660
112	4,450
114	4,268
116	4,019
118	3,918
120	3,750

TABLE 7—FACTORY SET BLOWER CONNECTION HIGH OR LOW SPEED

CONTROL MODULE	MAIN ELECTRICAL HARNESS CABLE	BLOWER WIRE	SPEED
J1-6	Orange	Orange	High
No Connection	No Connection	Blue + Cap	Medium
J1-4	Red	Red	Low

TABLE 8—MODIFY BLOWER CONNECTION HIGH OR MEDIUM SPEED

CONTROL MODULE	MAIN ELECTRICAL HARNESS CABLE	BLOWER WIRE	SPEED
J1-6	Orange	Orange	High
J1-4	Red	Blue	Medium
No Connection	No Connection	Red + Cap	Low

TABLE 9—TEMPERATURE AND VOLTAGE

TEMPERATURE °F (°C)	VOLTAGE DC VOLTS (J4)
-22 (-30)	3.5
-4 (-20)	2.7
5 (-15)	2.3
14 (-10)	2.0
32 (0)	1.4
41 (5)	1.1
50 (10)	0.9
68 (20)	0.6

A. Defrost Check

1. Make sure defrost cable is properly connected into J4.
2. Make sure thermistor assembly is correct. Measure thermistor temperature reading with multimeter. Select multimeter DC measurement scale 0-20v. At connector J4 (without removing thermistor cable), measure voltage between pins of thermistor cable. Depending on temperature of outside air intake, values should correspond with those in Table 9.
   If reading is not correct (reading 0v for short circuit or 5v for open circuit), change thermistor assembly.
3. If thermistor is good, do a RESET and see if defrost works. If defrost still does not work, change circuit board.

B. Advanced Debugging

Defrost can be simulated using the following procedures:

1. Unplug unit from 115vac.
2. Disconnect thermistor assembly from J4.
3. Replug unit in 115vac and select high-speed exchange.
4. Defrost should start within 2 minutes after high-speed exchange has been initiated.

TABLE 10—DEFROST CYCLE

OUTSIDE TEMPERATURE °F	STANDARD DEFROST (AS SHIPPED)	EXTENDED DEFROST (JUMPER JU1-F REMOVED)
Above 23°F	No Defrost	No Defrost
23°F to 5°F	6 Minute Defrost/60Minute Exchange	10 Minute Defrost/30 Minute Exchange
4°F to -17°F	6 Minute Defrost/32 Minute Exchange	10 Minute Defrost/20 Minute Exchange
Below -18°F	6 Minute Defrost/20 Minute Exchange	10 Minute Defrost/15 Minute Exchange

TABLE 11—JU1 JUMPER DEFINITION

JU1A	JU1B	JU1C	JU1D	JU1E	JU1F	JU1G
UNIT IDENTIFICATION				Reverse Damper Operation In = Normal Out = Inverse	Factory Set Always In	Factory Set Always In

TABLE 12—JUMPER LOCATIONS

MODEL	JUMPER TABLE						
	JU1A	JU1B	JU1C	JU1D	JU1E	JU1F	JU1G
HRVBBLHU1150	OUT	IN	IN	OUT	IN	IN	IN
HRVBBLHU1250	OUT	IN	IN	OUT	IN	IN	IN
HRVBBSVU1150	IN	OUT	OUT	OUT	IN	IN	IN
HRVBBSVU1250	IN	OUT	OUT	OUT	IN	IN	IN
HRVBBLVU1150	IN	OUT	OUT	OUT	IN	IN	IN
HRVBBLVU1200	IN	OUT	OUT	OUT	IN	IN	IN
HRVBBLVU1330	IN	OUT	OUT	OUT	IN	IN	IN

5. After test unplug unit.
6. Connect thermistor cable to J4.
7. Replug unit back in 115vac.

VI. CONTROL MODULE JUMPERS

Jumpers on the control module give exact configuration to HRV micro-controller. If there is a mistake in the jumper configuration,it can cause improper unit operation. This control has a simplified jumper selection mode. Jumper selection is done by the presence or absence of jumper at specific location (See Tables 11 and 12.)

⚠ **WARNING:** Always disconnect unit from 115vac prior to making any jumper change. If unit is not disconnected, micro-controller will never see jumper change. Failure to follow this warning could result in electrical shock or death.

VII. ERROR SIGNALING

Two types of error can be signaled by the wall control (automatic wall control only). In case of error, indicators on wall control will flash.

When error occurs, set dehumidistat at 80 percent position. This will enable you to properly troubleshoot problems.

TYPE 1—LOSS OF MEMORY (AUTO MODEL ONLY)

All indicators flash rapidly (rate of about once every sec). When this occurs, reset power and check if problem still exists. If indicators are still flashing, check red wire for shorting on another component. If error still exists, wall control has lost its memory. Replace wall control.

The defective wall control still works even when flashing, it is working in backup mode. Original modes of wall control are replaced by backup mode. (See Table 13.)

TABLE 13—BACK MODE

MODES	WALL CONTROL BACKUP MODE
OFF	OFF
1	INTERMITTENT
2	LOW-SPEED EXCHANGE
3	HIGH-SPEED EXCHANGE

TABLE 14—SYSTEM WIRING COLORS AND CONNECTIONS

CONTROL MODULE		WALL CONTROL WIRE	WALL CONTROL	
Terminal Block No.	Terminal Block Identification	Color	Terminal No.	Terminal Identification
J3-9	B	Black	J1-4	B
J3-8	G	Green	J1-3	G
J3-7	R	Red	J1-2	R
J3-6	Y	Yellow	J1-4	Y

TYPE 2—COMMUNICATION PROBLEM OR UNSUPPORTED MODE (AUTO MODEL ONLY)

All indicators flashing at a rate of about once every 8 sec. Communication is not properly entered or is not working.

A. Case 1

User changes the mode on wall control and HRV responds to command (OFF, LOW, or HIGH speed). Check all wires to wall control particularly red wire. (See Table 14.)

B. Case 2

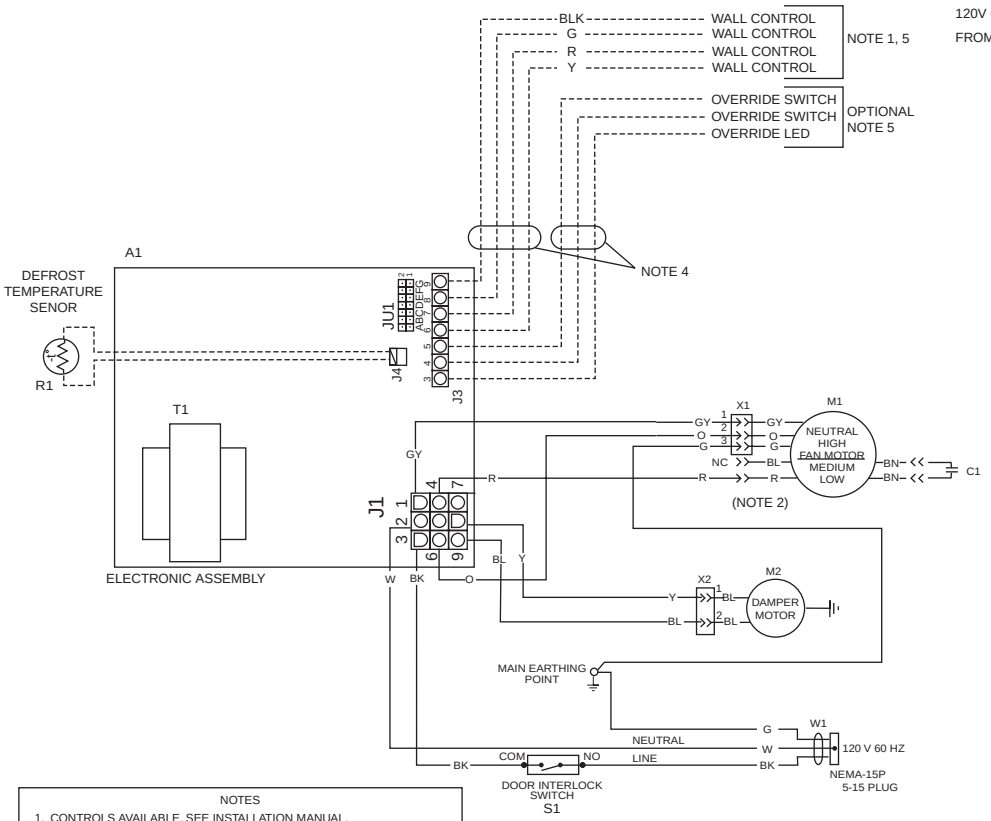
User changes the mode but, HRV does respond. All indicators flash at a rate of about once every 8 sec. Check all wires to wall control particularly green wire. If problem still exists, test wall control with 5 ft of wire from HRV. If this works, change wall control module inside HRV.

C. Reset

To reset HRV, proceed as follows:

1. Unplug HRV from 115vac.
2. Wait 15 sec.
3. Plug HRV into 115vac.

CONNECTION DIAGRAM



NOTES

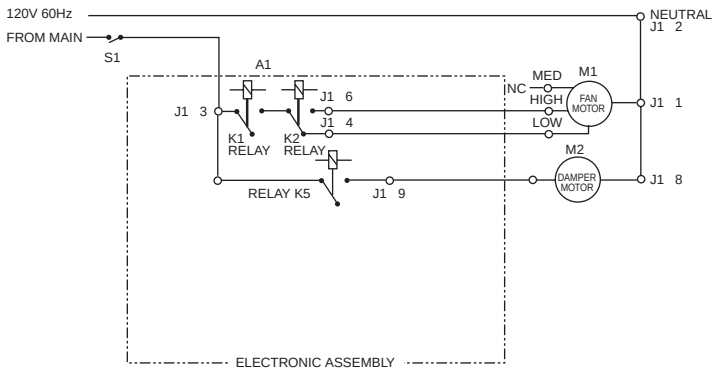
1. CONTROLS AVAILABLE. SEE INSTALLATION MANUAL. (LOW VOLTAGE ONLY 12 VOC.).
2. FACTORY SET WIRING FOR SLOWER SPEED SELECTION IS HIGH AND LOW. MEDIUM SPEED CAN BE SELECTED INSTEAD OF LOW SPEED. DISCONNECT RED WIRE FROM THE MOTOR RED TAP. AND CONNECT TO THE MOTOR BLUE TAP.
3. IF ANY OF THE ORIGINAL WIRE, AS SUPPLIED, MUST BE REPLACED. USE THE SAME OR EQUIVALENT WIRE.
4. USE FACTORY SUPPLIED PROTECTIVE TUBING.
5. FIELD WIRING MUST COMPLY WITH APPLICABLE CODES, ORDINANCES AND REGULATIONS.

LINE VOLTAGE
LOW VOLTAGE AND FIELD WIRE

COLOR CODE

R	RED	BK	BLACK
V	VIOLET	BL	BLACK
W	WHITE	GY	GREY
Y	YELLOW	O	ORANGE
BN	BROWN	G	GREEN
NC	NO CONNECTION		

LOGIC DIAGRAM



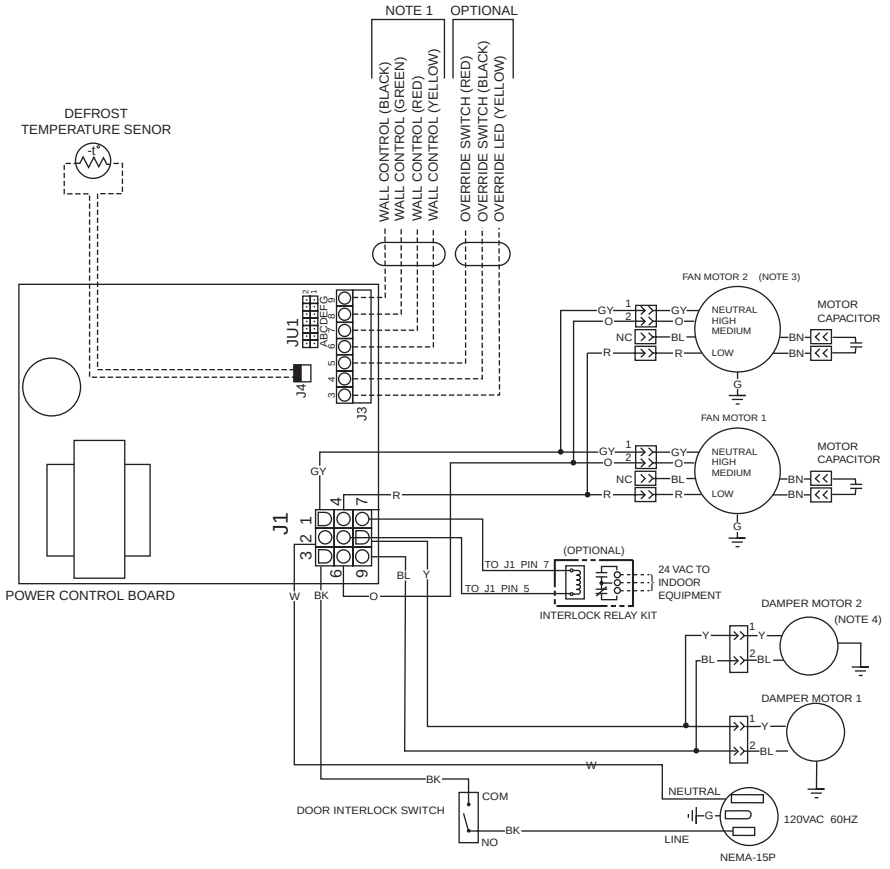
JUMPER TABLE JU1A	JU1B	JU1C	JU1D	JU1E	JU1F	JU1G	MODEL TYPE	FUNCTION TABLE LETTER	DEFROST TIME (DEFROST/VENTILATION) MINUTES 23°F / -5°C	5°F / -15°C	-22°F / -30°C
OUT	OUT	IN	IN	OUT	IN	IN	HRVBBLHU1150	A	6/32	6/32	6/20
OUT	OUT	IN	IN	OUT	IN	IN	HRVBBLHU1250	A	6/32	6/32	6/20
NO CHANGE	NO CHANGE	NO CHANGE	NO CHANGE	NO CHANGE	OUT	NO CHANGE	EXTENDED DEFROST ALL TYPES	A	10/30	10/20	10/15

FUNCTION TABLE A	RELAY			
MODE	K1	K2	K4	K5
Intermittent	0	0	0	0
Exchange Low	1	0	1	1
Exchange High	1	1	1	1
Circulation low	1	0	1	0
Circulation high	1	1	1	0
Defrost Cycle	1	1	1	0
Off	0	0	0	0
0 = Relay coil is de-energized				
1 = Relay coil is energized				
NS = Not supported				

A00035

Fig. 27—Wiring Diagram for Models: HRVBBLHU1150, and HRVBBLHU1250

CONNECTION DIAGRAM

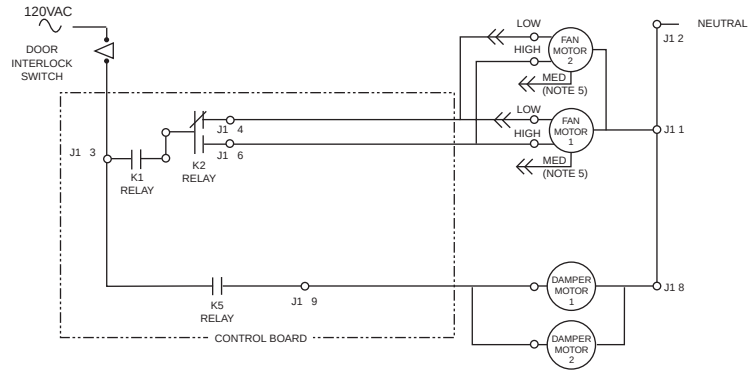


LINE VOLTAGE
LOW VOLTAGE AND FIELD WIRE
OPTIONAL

COLOR CODE

R	RED	BK	BLACK
V	VIOLET	BL	BLACK
W	WHITE	GY	GREY
Y	YELLOW	O	ORANGE
BN	BROWN	G	GREEN
NC	NO CONNECTION		

LOGIC DIAGRAM



JUMPER TABLE JU1A	JU1B	JU1C	JU1D	JU1E	JU1F	JU1G	MODEL	FUNCTION TABLE LETTER
IN	OUT	OUT	OUT	IN	IN	IN	HRVBBSVU1150	A
IN	OUT	OUT	OUT	IN	IN	IN	HRVBBSVU1200	A
IN	OUT	OUT	OUT	IN	IN	IN	HRVBBLVU1150	A
IN	OUT	OUT	OUT	IN	IN	IN	HRVBBLVU1200	A
IN	OUT	OUT	OUT	IN	IN	IN	HRVBBLVU1330	A

FUNCTION TABLE A	RELAY		
MODE	K1	K2	K5
Intermittent	0	0	1
Exchange Low	1	0	0
Exchange High	1	1	0
Circulation low	1	0	1
Circulation high	1	1	1
Defrost Cycle	1	1	1
Off	0	0	1
0 = Relay coil is de-energized			
1 = Relay coil is energized			
NS = Not supported			

NOTES

1 - THREE CONTROLS AVAILABLE. SEE THE INSTALLATION MANUAL (LOW VOLTAGE ONLY 12 VDC).

2 - FAN MOTOR 2 IS USED ONLY WITH HRVBBLHU1250, HRVBBLVU1200, AND HRVBBLVU1330.

3 - DAMPER MOTOR 2 IS USED ONLY WITH HRVBBLVU1200 AND HRVBBLVU1330.

4 - IF ANY OF THE ORIGINAL WIRE, AS SUPPLIED, MUST BE REPLACED, USE THE SAME OR EQUIVALENT WIRE.

5 - FACTORY SET WIRING FOR BLOWER SPEED SELECTION IS HIGH AND LOW. MEDIUM SPEED CAN BE SELECTED INSTEAD OF LOW SPEED. DISCONNECT RED WIRE FROM MOTOR(S) RED TAP AND CONNECT TO MOTOR(S) BLUE TAP.

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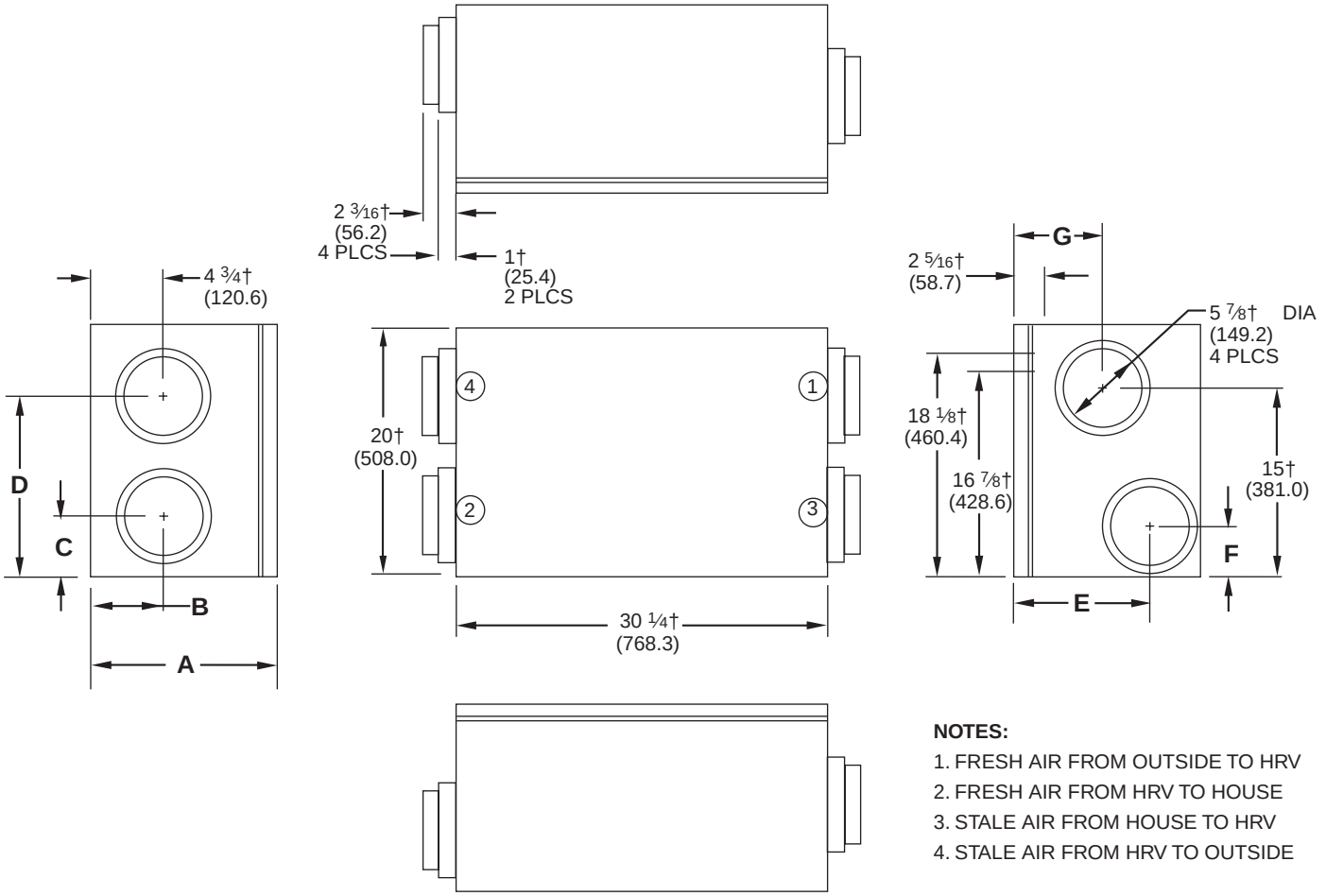
Fig. 28—Wiring Diagram for Models: HRVBBSVU1150, HRVBBSVU1200, HRVBBLVU1150, HRVBBLVU1200, and HRVB-BLVU1330



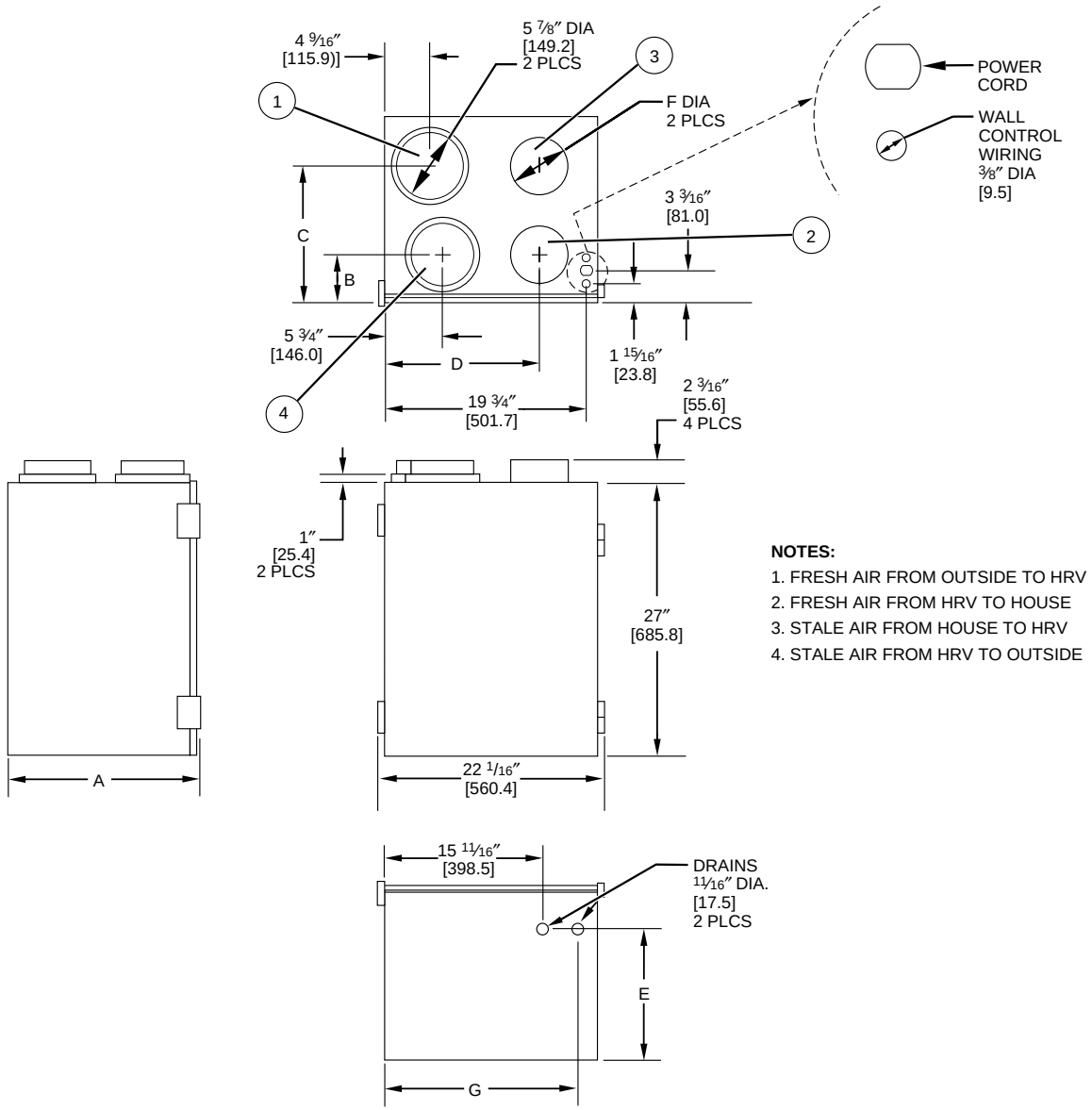
NOTES:

1. FRESH AIR FROM OUTSIDE TO HRV
2. FRESH AIR FROM HRV TO HOUSE
3. STALE AIR FROM HOUSE TO HRV
4. STALE AIR FROM HRV TO OUTSIDE

A99263

MODEL NO.	A		B		C		D		E		F		G	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
HRVCBBLHU1150	15-1/8	384.2	4-1/16	104	5-5/8	143.3	14-1/2	368.9	11-3/8	288.9	4-3/8	111.3	7-3/4	196.9
HRVBBLHU1250	19	483	5-13/16	147.7	5-1/16	128.1	14-1/2	368.9	11-3/16	254.0	5-13/16	401.6	9-5/16	236.6

Fig. 29—Dimensional Drawing HRVBBLHU



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MODEL NO.	A		B		C		D		E		F		G	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
HRVBBSVU1150	18-1/2	469.9	4-11/16	119.1	13-5/16	388.2	15-7/16	392.1	13-9/16	344.5	5-7/8	149.2	19-15/16	506.2
HRVBBSVU1200 HRVBBLVU1150	24-1/2	622.2	8-3/16	208.0	19-5/16	490.6	14-9/16	369.9	16-15/16	430.2	6-7/8	174.6	19-15/16	506.2

Fig. 30—Dimensional Drawing HRVBBSVU and HRVBBLVU

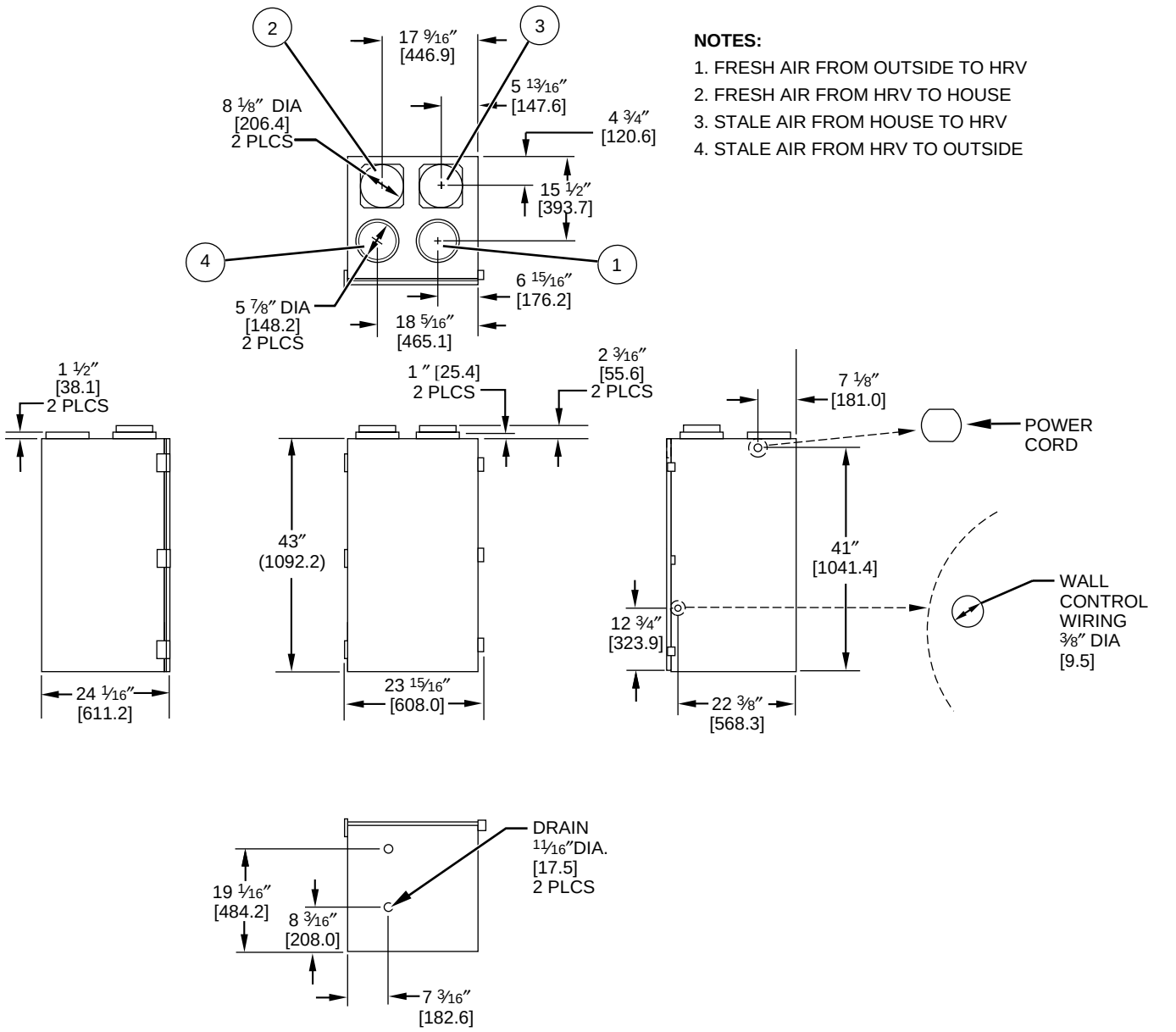

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Fig. 31—Dimensional Drawing HRVBBLVU1200 or HRVBBLVU1330

SERVICE TRAINING

Packaged Service Training programs are an excellent way to increase your knowledge of the equipment discussed in this manual, including:

- Unit Familiarization
- Maintenance
- Installation Overview
- Operating Sequence

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